

Our Planet

Data-Centric Simulations Enable Greater Insights Into Global Climate Change

Weather and climate simulations of increasing duration, resolution, and complexity require faster processors and larger memory in order to be completed in an accurate and timely manner. NASA Goddard Space Flight Center is building a data-centric climate simulation capability to advance the research, analysis, and predictive modeling activities of the Agency's Earth Science Division. This capability includes:

- An expanded high-end computing system based on Intel's Nehalem processor—enabling dramatic performance increases
- Robust access to datasets from NASA's Earth Observing System satellites and other observational platforms for assimilation into climate models
- State-of-the-art systems and tools enabling scientists to better analyze, visualize, and manage their data
- Broad distribution of simulation datasets, including those for the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (to be completed in 2014)

NASA Goddard simulations span timescales from days (weather) to seasons and years (short-term climate predictions) to decades and centuries (long-term climate change). Highlights include:

- 3.5-kilometer simulations producing never-before-seen features such as hurricane eye walls and convective cloud clusters
- Near-completion of a reanalysis of the last 30 years of weather and climate—one of the largest assimilation datasets available today
- Paleoclimate simulations of climate change reaching back as far as 1,000 years

Among other benefits, NASA weather and climate simulations help determine optimal use of the latest satellite observations in predictions, ultimately leading to increased accuracy of weather and climate forecasts by operational agencies such as the National Oceanic and Atmospheric Administration (NOAA) and its National Weather Service.



This year, NASA Goddard has added 8,256 Intel Nehalem processors to its Discover climate simulation system. Among other applications, Discover will host NASA's climate simulations for the Intergovernmental Panel on Climate Change. (Pat Izzo, NASA)



New high-resolution climate simulations reproduce atmospheric features not previously seen in NASA computer models. A 3.5-kilometer resolution simulation (left) yields cloud clusters like those seen in observations (right) from NOAA's latest GOES satellite. (Shian-Jiann Lin, NOAA)